CHAPTER 6

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CONCLUSION

1.0 Purpose

In this chapter a summary of the procedure, a description of the objectives and hypotheses, findings of the study and their discussions, educational implications and suggestions for further research are presented.

2.0 Summary of the Procedure

The study was designed to test the effectiveness of mastery learning strategy and conventional textbook approach on achievement, retention, science interest, scientific attitude, achievement motivation and self concept.

Learning materials and tools needed for the study were prepared. A sample of 156 pupils from two schools of Ernakulam district of Kerala state was selected for the study. The data collected were analyzed to determine the effectiveness of the mastery learning strategy.
3.0 Objectives of the Study

(i) To prepare learning materials based on mastery learning strategy in physics for standard IX.

(ii) To compare the effect of mastery learning strategy with conventional textbook approach on achievement in physics of IX standard pupils.

(iii) To compare the effect of mastery learning strategy with conventional textbook approach on the retention power of IX standard pupils.

(iv) To compare the effect of mastery learning strategy with conventional textbook approach on the science interest of IX standard pupils.

(v) To compare the effect of mastery learning strategy with conventional textbook approach on the scientific attitude of IX standard pupils.

(vi) To compare the effect of mastery learning strategy with conventional textbook approach on the achievement motivation of IX standard pupils.
To compare the effect of mastery learning strategy with conventional textbook approach on the self concept of IX standard pupils.

### 4.0 Hypotheses

Keeping in view the objectives of the study, following hypotheses were formulated.

**(i)** The achievement of pupils in physics taught by mastery learning strategy will be significantly higher than that of pupils taught in the conventional textbook approach.

**(ii)** The retention power of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach.

**(iii)** The science interest of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught in conventional textbook approach.

**(iv)** The scientific attitude of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach.
(v) The achievement motivation of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach.

(vi) The self concept of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach.

5.0 Major conclusions arrived at, based on the findings

5.1 Effect of Instructional Methods on Achievement

Mastery learning strategy is more effective than the conventional textbook approach on achievement in physics of IX standard pupils. This conclusion is supported by the following findings.

(i) When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio CR = 5.59; P < 0.01). The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 43.41, and mean $M_2$ for the control group = 38.77).
When the gain scores \([(\text{post-test score}) - (\text{pre-test score})]\) of pupils in the experimental and control group were compared, the difference between their means was found to be significant (Critical ratio CR = 5.76; P < 0.01). The experimental group was found to be superior to the control group (Mean $M_1$ for experimental group = 30.56, and mean $M_2$ for the control group = 25.78).

The analysis of co-variance of pre and post-test scores of pupils in the experimental and control groups showed significant difference between the two groups. ($F_{y.x}$ for df = $1/153$ = 33.21; P < 0.01). The experimental group was found better than the control group in achievement ($M_{1y.x} = 43.45$ and $M_{2y.x} = 38.73$).

The adjusted means for post-test scores were tested for significance for df = $1/153$. The t value obtained was significant at 0.01 levels ($t = 5.77$; P < 0.01). The significant t value confirms that the two means differ considerably. The conclusion is that the experimental group far out weighed the control group in performance.
5.2 Effect of Instructional Methods on Retention

Mastery learning strategy is more effective than the conventional textbook approach on the retention power of IX standard pupils. This conclusion is supported by the following findings.

When the retention scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio CR = 4.43; P < 0.01). The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 93.04, and mean $M_2$ for the control group = 87.59).

5.3 Effect of Instructional Methods on Science Interest

Mastery learning strategy is more effective than the conventional textbook approach on the science interest of IX standard pupils. This conclusion is supported by the following findings.

(i) When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio
The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 27.87, and mean $M_2$ for the control group = 24.32).

(ii) When the gain scores [(post-test score) - (pre-test score)] of pupils in the experimental and control groups were compared, the difference between their means was found to be significant (Critical ratio $CR = 9.82; P < 0.01$). The experimental group was found to be superior to the control group (Mean $M_1$ for experimental group = 5.78, and mean $M_2$ for the control group = 1.46).

(iii) The analysis of co-variance in pre-test scores and post-test scores of pupils in the experimental group and control group showed significant difference between the two groups. ($F_{y,x}$ for df = 1/153 = 100.35; $P < 0.01$). The experimental group was found better than the control group in achievement ($M_{1y.x} = 28.25$ and $M_{2y.x} = 23.94$).

(iv) The adjusted means for post-test scores were tested for significance for df = 1/153. The $t$ value obtained was significant at 0.01 levels ($t = 10.03; P < 0.01$). The significant $t$ value confirms that the two means differ considerably. The conclusion is that the experimental group far out weighed the control group in performance.
5.4 Effect of Instructional Methods on Scientific Attitude

Mastery learning strategy is more effective than the conventional textbook approach on the scientific attitude of IX standard pupils. This conclusion is supported by the following findings.

(i) When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio $CR = 2.94; P < 0.01$). The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 86.51, and mean $M_2$ for the control group = 82.39).

(ii) When the gain scores $[(post-test score) - (pre-test score)]$ of pupils in the experimental and control groups were compared, the difference between their means was found to be significant (Critical ratio $CR = 7.13; P < 0.01$). The experimental group was found to be superior to the control group (Mean $M_1$ for experimental group = 6.18, and mean $M_2$ for the control group = 1.12).

(iii) The analysis of co-variance in pre-test scores and post-test scores of pupils in the experimental group and control group
showed significant difference between the two groups. \((F_{y,x} \text{ for } \text{df} = 1/153 = 50.11; \text{P} \leq 0.01)\). The experimental group was found better than the control group in achievement \((M_{y,x} = 86.97 \text{ and } M_{2y,x} = 81.95)\).

(iv) The adjusted means for post-test scores were tested for significance for \(\text{df} = 1/153\). The \(t\) value obtained was significant at 0.01 levels \((t = 7.09; \text{P} \leq 0.01)\). The significant \(t\) value confirms that the two means differ considerably. The conclusion is that the experimental group far out weighed the control group in performance.

5.5 Effect of Instructional Methods on Achievement Motivation

Mastery learning strategy is more effective than the conventional textbook approach on the achievement motivation of IX standard pupils. This conclusion is supported by the following findings.

(i) When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant \((\text{Critical ratio} \text{...})\)
CR = 4.62; P < 0.01). The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 81.83, and mean $M_2$ for the control group = 74.21).

(ii) When the gain scores $[(\text{post-test score}) - (\text{pre-test score})]$ of pupils in the experimental and control groups were compared, the difference between their means was found to be significant (Critical ratio CR = 10.87; P < 0.01). The experimental group was found to be superior to the control group (Mean $M_1$ for experimental group = 6.39, and mean $M_2$ for the control group = 1.28).

(iii) The analysis of co-variance in pre-test scores and post-test scores of pupils in the experimental group and control group showed significant difference between the two groups. ($F_{y,x}$ for df = 1/153 = 129.46; P < 0.01). The experimental group was found better than the control group in achievement ($M_{1y,x} = 80.64$ and $M_{2y,x} = 75.40$).

(iv) The adjusted means for post-test scores were tested for significance for df = 1/153. The $t$ value obtained was significant at 0.01 levels ($t = 11.46$; P < 0.01). The significant $t$ value confirms that the two means differ considerably. The conclusion is that the experimental group far out weighed the control group in performance.
5.6 **Effect of Instructional Methods on Self concept**

Mastery learning strategy is more effective than the conventional textbook approach on the self concept of IX standard pupils. This conclusion is supported by the following findings.

(i) When the post-test scores of pupils in the experimental and control groups were compared, the difference between their means was found to be statistically significant (Critical ratio $CR = 4.30; P < 0.01$). The experimental group was found to be superior to the control group. (Mean $M_1$ for experimental group = 80.63, and mean $M_2$ for the control group = 73.06).

(ii) When the gain scores $[(\text{post-test score}) - (\text{pre-test score})]$ of pupils in the experimental and control groups were compared, the difference between their means was found to be significant (Critical ratio $CR = 11.24; P < 0.01$). The experimental group was found to be superior to the control group (Mean $M_1$ for experimental group = 7.79, and mean $M_2$ for the control group = 1.60).

(iii) The analysis of co-variance of pre and post-test scores of pupils in the experimental and control groups showed significant difference between the two groups. ($F_{y,x}$ for $df =$
1/153 = 126.89; P < 0.01). The experimental group was found better than the control group in achievement (M₁y.x = 79.95 and M₂y.x = 73.74).

(iv) The adjusted means for post-test scores were tested for significance for df = 1/153. The t value obtained was significant at 0.01 levels (t = 11.29; P < 0.01). The significant t value confirms that the two means differ considerably. The conclusion is that the experimental group far out weighed the control group in performance.

6.0 Tenability of Hypotheses

On the basis of the findings, the first hypothesis formulated by the investigator “The achievement of pupils in physics taught by mastery learning strategy will be significantly higher than that of pupils taught in the conventional textbook approach” was accepted.

The second hypothesis “The retention power of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach” was found tenable and was also accepted.
“The science interest of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught in conventional textbook approach” which is the third hypothesis was also accepted in the light of the above findings.

The fourth hypothesis “The scientific attitude of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach” was also substantiated and accepted based on the findings.

“The achievement motivation of pupils taught by mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach” which is the fifth hypothesis was also found tenable.

Above findings substantiate the acceptance of the sixth hypothesis that is “The self concept of pupils taught by the mastery learning strategy will be significantly higher than that of pupils taught by conventional textbook approach”.

7.0 Discussions Based on the Findings

Based on the above findings of the study, the mastery learning strategy has been found to be the most beneficial to learners in raising their achievement, science interest, scientific
attitude, achievement motivation and self concept. Mastery learning strategy was found to be very effective in the case of retention power also.

These findings are supported by the results of earlier studies based on cognitive as well as personality variables. In contrast, some studies are against these findings. The findings regarding achievement variable are supported by results of earlier studies of Collings (1969), Chaudhari and Vaidya (1986), Kincaid (1991) and Ritchie and Thorkildsen (1994). In contrast, Yildiran (1977), Guskey and Monsaas (1979), Wortham (1980) and Slavin (1984) in their study of achievement through mastery learning strategy did not find any significant change.

The findings that retention power of pupils enhanced through MLS is supported by the studies of Kaul (1985) and Zapico (1991) but opposed by the studies of Chand (1984) and Maurer (1991).

The findings related to science interest are supported by the study of Samuel (1997) and opposed by Block (1972).

In the case of attitude of pupil towards the subject of study, studies conducted by Yadav (1984) and Vaidya (1990) supported the present findings. In contrast Dillashaw and Okey (1983) and
Long (1991) found no significant change in the attitude of pupils towards the subject of study.

The findings regarding achievement motivation are supported by Grabe and Latta (1981), Clark (1983) and Koul (1986).

With regard to the findings of self concept, studies conducted by Torshen (1968) and Mathur (1988) supported and Singh (1983) did not find any significant difference in the self concept of pupil after adopting MLS.

The findings of the study are in tune with the expectation of the investigator. The main reason behind these results is that the mastery learning strategy has been stood for the mastery of the subject units. It claims for the mastery of subject matter irrespective of level of ability of the pupils. Therefore, it is very clear that the appropriate use of this strategy in the classroom has to facilitate learning and enhance the cognitive variables of the pupils. Since the strategy aims at providing successful and rewarding experience to majority of students and also provides opportunities for co-operative activities, it is very sure that its application in the classroom would improve the personality variables of pupils. Thus, it can be concluded that planning and organisation of time and resources, and the effective procedures of
the mastery learning strategy were the responsible factors for the present findings of the study. Exposure of students to a new, interesting, and co-operative approach might have also been one of the reasons for these results.

### 8.0 Educational Implications

The findings of this study proves that mastery learning strategy is effective in enhancing achievement, retention, science interest, scientific attitude, achievement motivation and self concept of pupils. This has important implication in teaching of science as it can be used to reduce the number of under achievers, dropouts and failures by ensuring almost equal attainment on the part of the learners irrespective of their initial ability.

The mastery learning procedures helps the teacher to plan instruction according to the varied needs of the pupils. The teachers should set their mind to make use of the alternative instructional materials to attain mastery criterion.

Since mastery learning strategy provides opportunities for almost all students to attain mastery of the content and getting a chance to pass through successful and rewarding learning experiences continuously through co-operative group learning
techniques, their affective outcomes might have been enhanced. Therefore it becomes necessary for the teachers to utilize mastery learning strategy for realising affective outcomes of the learners.

The formative diagnostic tests utilized in mastery procedure were found to be much effective in providing feedback both to students and teachers. Therefore, teachers should be trained to develop and make use of formative evaluation in their teaching process.

The mastery learning strategy is based on no technology or equipment except the technology of developing instructional materials and indigenous organisational models for providing instructional channels with the existing school and classroom setting (Hooda, 1984). It can be seen that by making minor structural changes in our classrooms, the group based mastery learning strategy, which is used by the investigator, can be implemented by our teachers.

The problem of dropout is to be tackled by ensuring quality of instructions and corresponding achievement on the part of the learner. Unless, it is ensured that each pupil in the earlier standard learns all the core concepts and skills, his subsequent learning potential will remain fragile (Vaidya, 1991). This demands the special attention of teachers and curriculum designers to
ensure the attainment of all the concepts and skills of a particular class to the mastery level by almost all students of the class.

Many alternative learning materials were utilized in the present study. But we cannot expect that the teachers have to prepare all this material by themselves. Therefore, it is essential that the curriculum designers develop instructional packages for each subject and make them available to teachers to use them effectively. The curriculum designers are also expected to develop curriculum by keeping the hierarchical sequence of concepts, generalisation and rules. The pre requisites needed for each learning unit should be provided in the curriculum.

The existing curricula will not be able to cope with the proposed mastery learning strategy. So the curricula must be modified accordingly. This strategy should be incorporated in the curriculum of pre-service teacher training programme. In-service teacher training should be provided to pre-primary to higher secondary level based on this strategy of instruction.

The study thus recommends for the following,

(i) State level academic bodies should take steps to raise the expectations of educators by exposing them to extensive in-
service training, conferences or workshops based on the philosophies of Carroll (1963) and Bloom (1968).

(iii) As a result of extensive training and increased awareness, District institutes or District resource groups should work to design programme, set educational standard and develop a model of operational details.

(iii) State level workshops should be conducted to develop parallel corrective and enrichment materials as well as formative and summative tests.

(iv) State level academic bodies should develop and operate computer resource banks for sharing corrective and enrichment activities based on specific learning objectives.

(v) Curricular materials suitable to mastery learning should be developed, with formative and summative tests as well as corrective and enrichment activities linked to specific learning objectives.

(vi) The existing curriculum of the pre-service teacher training programmes should be modified according to the demands of mastery learning strategy.
9.0 Suggestions for Further Research

The present study is a limited one due to the reasons like lack of time, sample size, diversity (in age, subject, socio-economic status etc.) and other facilities. Keeping in view the limitations of this study and the constraints under which it was conducted, the findings do not claim for wide generalisation. It is therefore suggested that:

(i) The studies on a larger sample are needed to arrive at a more reliable and precise results.

(ii) Studies can be conducted based on the achievement of learners of different age groups, subject areas, sex, socio-economic status and intelligence.

(iii) The study can be extended to other levels like lower primary, upper primary, higher secondary and university.

(iv) Similar investigation can be made for the high school physics as a whole and widening the sample size so that the study would help to have a clear picture of the effectiveness and adaptability of mastery learning strategy.

(v) Studies based on individualised mastery learning strategy can be attempted at various levels of learning.
(vi) Effect of mastery learning strategy on some other cognitive and personality variables can be tested.

(vii) The present study gives importance to only the cognitive and affective variables. Therefore, studies based on psychomotor outcomes also to be undertaken.

(viii) Many studies highlighted the problem of 'Robinhood effect' in mastery learning strategy. Studies based on this have to be taken up by future researchers.